

S
Insect Control
Targhee

RESUME OF TARGHEE INSECT CONTROL
1928 - 1931

The epidemic of Mountain Pine Beetle (*Dendroctonus monticolae*) on the Targhee Forest is part of a regional epidemic in Lodgepole pine that extends along the Rocky Mountains from Canada to the southern limit of the Lodgepole pine type in Utah and Colorado.

The joint objective of control work during the last few years on the group of forests in the central part of the infested territory has been to prevent the spread of the epidemic into Yellowstone National Park. On this account and because the separate control jobs were included in one general plan of action the combined work has been designated by the Bureau of Entomology "The Yellowstone Park Barkbeetle Control Project." It includes Yellowstone Park and the Beaverhead, Gallatin, Targhee, Teton, Wyoming, Caribou and Cache National Forests.

Previous Epidemic

During the period 1911-1914 there was a serious infestation of Mountain Pine Beetle on the Targhee Forest coincident with infestations centered on the Flathead, Missoula, Deerlodge and Beaverhead forests of Region 1. Control work was done on the Region 1 forests. The method used was to peel the bark from infested trees to a height of 12 or 15 feet and to cut for peeling those trees showing pitch tubes higher up. The infestations died out.

On the Targhee Forest, records show that infested Lodgepole pine trees were noticed in small numbers as far back as its establishment in 1905. The epidemic started in 1911 and ran its course for 5 years, dying down in 1915. There were small infestations wherever Lodgepole pine occurred on the forest. The centers of infestation were between East Camas and Icehouse creeks on District 1, in Chick Creek on District 2, in the vicinity of High Point and the Railroad Ranch on District 3, between Squirrel Creek on District 4 and Badger Creek on District 5, along the point of the Bighole Mountain to Canyon Creek in Districts 6 and 7, and in Long Springs and Little Elk Creek in District 8.

No systematic control work was done but in the heaviest center of infestation, between Squirrel Creek and Badger Creek and from the boundary to the state line, 60 per cent of the infested trees were cut and removed through

sales to several small sawmill operators and to farmers and by administrative use and free use. The infestation continued longest on this area and it was on the north part of it that one of the earliest heavy centers of infestation of the present epidemic occurred. No new infestation has occurred in the vicinity of the Chick Creek area where nearly every tree was killed in the 1911 to 1915 epidemic over a territory 4 miles long and one-half mile wide. No other control work of much consequence was done but the epidemic died out from natural causes. No attacks were noticed on the forest from about 1918 to 1926 but occasional groups of black tops killed more recently than 1918, have been found in the Lodgepole pine type.

Present Epidemic

The present infestation on the Targhee Forest first became noticeable in 1927 when groups of red tops were found in a 6 mile strip on "The Point" south from Grandview Ranger Station, in Henderson Creek west of Victor, in Pleasant Valley, Dry Creek, and Rattlesnake Creek on the Spencer District, and along the Reclamation road near the forest boundary on the Porcupine District. A small number of black tops in each location indicated an earlier start of the infestation.

In 1928 a large infestation was found near the forest boundary between Fall River and Bitch Creek, in which the ratio of new attacks to red tops and of red tops to black tops was very great, indicating a tremendous rate of spread of the epidemic. Since that time, despite very intensive control work, scattered infestations have appeared all over the forest and new heavy centers of infestation have developed each year both adjoining and at a distance from control areas.

The start of the regional epidemic was on the Missoula Forest where control work began in 1924 and was continued on the Bitterroot. In 1926, 1927 and 1928 a final, futile effort was made in the Big Hole Basin to stop a southward advance of the beetles. An infestation on the Salmon Forest became epidemic in 1927 and the western R-4 group of forests from the Salmon and Lemhi to the Weiser were too heavily infested in stands of low value for feasible control at the time projects were under way in Region 4.

The epidemic became widespread throughout the whole length of the Lodgepole pine type in the Rocky Mountains in the comparatively short period of 1924 to 1931. Local infestations on the national forests of this long territory all appeared within a period of about three years and they became epidemic in consecutive order from the northern to the southern limits.

Targhee Control

1928 The first control work done on the Targhee Forest was in the spring of 1928 on the point of the Bighole Mountain west of Teton Basin. In April 400 infested trees were cut and in May when the snow was not deep they were skidded into piles and burned. Some of the trees were bark-stripped on 4 sides. This work was done with contributed time and with the cooperative work fund.

Experiments were made at this time in peeling standing trees, charring the bark of standing trees by burning piles of brush and dry poles leaned against them, and by burning trees sprayed with kerosene. The burning-standing method of treatment was developed and has been used in the control work in Lodgepole pine in Region 4.

Control work with the new method was resumed on May 19 and 2,568 infested trees were treated on an area of 1,500 acres in Milk Creek, Station Gulch, Rammell Hollow, Packsaddle and Paterson Creek of District 6. Three hundred seventeen trees were treated in Rattlesnake Creek, and 3,000 infested trees were disposed of by tie sale in Milk Creek during 1927 and 1928.

In this first treating, spotting and treating crews worked separately. The spotters located and tagged the infested trees and furnished locality descriptions. The treating crew sprayed the tree trunks with kerosene for a length of 15 to 22 feet, lighted it and charred the bark. They felled for treating large heavily infested trees that could not be burned high enough while standing. The 2½ gallon pressure pumps used were essentially the same as the 4 gallon D. B. Smith Banner No. 22 pumps used in the later work, except that a flat disc nozzle was replaced by a longer nozzle of hose type and the quality of materials and construction were improved.

It was found that woodpecker work was a great help in detecting infested trees; also fine fresh sawdust in the crevices of the bark of trees that showed inconspicuous or no pitch tubes. Blue stain of the sapwood was also found to indicate a successful attack.. By the first part of June the foliage of heavily infested trees began to fade and turn yellow, which made spotting very much easier and quicker.

Fall examinations showed that numbers of beetles had escaped from missed trees, from the butts of thick-barked trees, from insufficiently treated strips of bark and from the tops of trees treated to only the 18 to 20 foot height believed to be sufficient at the time. Numbers of beetles probably escaped also from trees not treated because, examined with a hatchet, it was believed that the beetles had been "pitched out." Red tops were found over

a wide territory outside of the areas treated. The infestation had been greatly reduced but the control areas needed treating again. New and rapidly spreading infestations were discovered on Districts 1, 4 and 7.

1929 31,204 infested trees were treated in the spring, and 800 were treated in the fall of 1929.

The control work was extended to all known infested areas on the forest. Four camps were established on May 13 in the infested areas of Districts 1, 4, 6 and 7, and one week of advance spotting preceded the burning.

The camp organizations were large, averaging 18 men, and each camp was moved several times. The spotting and burning crews worked separately. A diagrammatic chart was used to keep track of the relative locations of infested trees and the spotters traveled abreast about two chains apart, covering the timber type in parallel strips. Fuel oil was used instead of the more expensive kerosene, and it was distributed in 50-gallon barrels by wagon, and by improvised horse-drawn sleds, or "lizards." A packer and two packhorses to carry oil from the barrels to the burners were added in 1929, for each crew of 4 to 6 burners. To throw the oil higher on the tree trunks, heavy 8 ft. 1/4 inch iron pipe extensions were procured, proved too cumbersome, and were replaced by 4 foot lengths.

An attempt was made to dispose of the insect infested trees on the Granite Butte area of District 4 by sale of the timber to the Globe Timber Company, in the contract for which an administrative use clause proffered two green ties for each tie made from infested trees. Only a few ties were cut from infested trees, and the company was required to burn 904 trees before the spring flight. Unless pitching out was very evident, all of the trees having pitch tubes were treated in 1929.

Fall treating was done on a small scale in October and November on districts 1, 4 and 6. Two 4-foot lengths of extension were used on each pump, by which 6 to 8 feet additional height of the oil stream was obtained. The early fall work was as effective as spring treating; the trees treated after the wood was frozen and the air had become cold required treating again the next spring. A two and one-half per cent estimate of new attacks was made in the fall on all the treated areas and on all the untreated territory known to be infested. The surrounding territory was also searched. Watch was kept all summer for infested trees and for groups of red-tops. On account of the general low relief of the Lodgepole pine territory, red tops were not prominent and could easily have escaped notice. The 1929 control reduced the attacks 75% on the area treated in 1928.

1930 There were so many new centers of infestation that an organization of 15 camp units was necessary in the spring of 1930. The size of the camp units was reduced to 8 or 12 men and the territory assigned to each camp organization was smaller than the year before. Twelve forest officers were detailed to the Targhee from other forests to act with the Targhee forest officers as camp managers and crew foremen. 30,065 infested trees were treated in the spring on 67,948 acres.

The methods were varied, one-half of the camps being organized with separate spotting and burning crews and one-half of them with one crew of spotter-burners.

The separate spotting crew of three men worked abreast and the center man used a compass to keep the line straight and the strips parallel, the outside man blazing for closure on the return trip through the type. From the spotter's drainage map the trees were located by a treating crew of 2 to 4 burners with 1 or 2 mounted packers, each having 2 to 4 pack horses carrying 20 gallons of oil apiece in 2 Model T Ford tanks equipped with a drain pipe and faucet and with chains for hanging them over the packsaddles.

Those crews which combined the two operations covered the territory in the same manner. A compassman in the center kept the line. Two spotter-burners on each side of him searched for infested trees within individual strips approximately 50 feet in width, and two mounted packers followed behind with from 2 to 4 pack horse loads of oil, the pressure pumps and extensions. The 4 spotter-burners treated the trees as they were located. Nine foot metal extensions in 3 foot sections were used on tall trees and when the wind blew so that all the trees were either "crowned" by the fire or were treated their entire infested lengths.

In September a 2 $\frac{1}{2}$ % estimate was made of the new attacks. In addition to the treated areas it covered, those areas in which new infestations had developed and enough of the adjoining territory to include scattered attacks. Strips one chain wide were run at one-half mile intervals. No new attacks were found on the treated areas of the Pleasant Valley watershed of District 1, on Wolverine Creek, Flat Hollow, Warm Creek and Wright's Creek of District 7 and on parts of the north end of District 6. The survey of the area between Squirrel and Bitch Creeks on District 4 showed an increase, partly accounted for by missed trees and partly by an untreated infested area on the adjacent higher Fall River Ridge to the north. The survey showed the infestation on the whole to have been reduced 67%. In reality the average reduction was greater on treated areas, but unsuspected scattered growing infestations found the next spring on

territory not covered by the survey raised the general infestation to a greater number of attacks.

Fall control on a smaller scale was done on all of the ranger districts of the forest except District 7. The fall season was unusually mild and long after the early cold rains and 3671 trees were treated on a total area of 8,740 acres. Extra precautions were taken to secure complete treatment by using the 9 foot extensions and falling for top treating all trees which did not crown thoroughly. In addition, the heavy lower bark of large trees and of thick barked small ones was peeled from the butts to a height of 4 to 6 feet. The fall treating was very satisfactory but this successful treating could not be duplicated in the usual windy and rainy period of that time of the year.

No more attacks have been found on the Outlet control area of District 2 since the 1930 spring burning of 2,433 infested trees and the fall burning of 150.

1931 The spring of 1931 was very early and the control work started on April 28. The infested territory was covered in 25 topographical units by 11 ten man crews, 1 nine man crew, 2 eight man crews and 1 six man crew. An infestation had developed in the southwest part of Yellowstone Park and the Park Service established three camps, using the burning-standing method of treatment.

The crews were all organized for treating the infested trees as they were found and with a line-up of the men that proved to be the most effective and economical of the methods used. The territory was covered in systematic strips from a straight initial guide line established through the timber for each crew with a compass. Walking about 50 feet apart and each looking over all the trees in a strip of that width the crew followed the blazed guide line, the man next to the line being ahead and each of the other men keeping a little to the rear of the man on that side of him in order to keep his direction and a uniform width of strip. The last man blazed an outside line that became the guide line for the return parallel strip. Each man carried a flagged staff to mark his position when leaving his strip to treat trees. The crew foreman travelled back and forth behind the men to make sure that no infested trees were missed and to maintain the alignment and quality of the work. A mounted packer followed with 2 or 3 packhorses loaded with fuel oil in the Model T Ford tanks and he carried the pressure pumps, axe, cross-cut saw and lunch on top of the tanks. The pressure pumps were turned upside down and the air let out through the nozzle each time they were put back on the horses to prevent the leakage of oil when carried under pressure. When the packer returned to the barrels for more oil a loaded packhorse

was led by the foreman or a member of the crew.

The infested trees were treated by the whole crew as they were found on the strips. One or two men having 9 foot extensions oiled the high parts of a tree trunk and one without an extension oiled the lower part, all of them working on one side of a tree at a time to avoid accidental drenching. Together they carried the flames up through the top, the volume of flame "crowning" the tree more readily than when only one pressure pump was used. Those trees that could not be crowned thoroughly were felled and top-treated on the ground. Where the infested trees occurred in large groups two men of the crew remained behind with a packhorse load of oil and a pressure pump and felled and top-treated the uncrowned trees tagged by the men ahead. It was necessary to fell for top treating only $18\frac{1}{2}\%$ of the infested trees on the whole forest control area. 32,316 trees were treated on 102,870 acres and 5,976 of them were felled and top treated.

Every known precaution was taken in 1931 to prevent reinfestation of treated areas. Travel on the strips was slowed down enough to make sure that no infested trees were missed, each tree was given a longer treatment and either crowned or felled and top treated.

The objective had been the locating and complete treating of every infested tree on the forest. However, as the work proceeded it was found that the control organization would not be able to cover the entire infested territory - that the infestation was more extensive than had been shown by the 1930 survey and that we were not keeping up with the development or spread of the beetles.

The scope of the control work was enlarged and so planned that if the entire infested area could not be treated the unfinished parts would be left in solid blocks where they would be less likely to reinfest treated areas.

Work was continued until July 9 in an effort to leave as little untreated infested territory as possible and as a precaution against fire the working hours during the last three weeks were from 5 a. m. to 1 p. m., at which time the wind was down, the humidity was lower and fires did not run readily. Sticks and heavy litter were removed from around the bases of the trees before treating and burning grass was put out before it was left.

In an ordinary season these precautions would have sufficed in this part of Region 4. As it happened, it was the beginning of an abnormally dry season. The usual showers did not occur. Small fires began to show up and the work was stopped to put them out. Apparently some of the fires had been smoldering in heavy duff on areas

treated as early as June 1 and some of them blew up as late as the middle of August.

Despite the late work the infested area could not be fully covered. During the last part of the job the Twin Creek-Little Piney Creek unit on District 6 was hurriedly covered by searching for yellow-tops. The upper part of Porcupine Creek had to be left untreated, as were parts of several other camp units of districts 3 and 4. In the fall of 1931 168 infested trees were treated on District 4 during the 5 day period between the insect survey and a heavy snowfall on November 10.

1931 Insect Survey

In the fall of 1931 a systematic insect survey was made of the whole Lodgepole pine type of the forest, except the north end of District 2, in order to find out if more new centers of infestation were developing from scattered attacks and how much of the untreated parts of the forest contained scattered attacks. Previous surveys had covered the treated areas, the territory surrounding them and other territory known to be infested or showing red tops, but after each season of control work new centers of infestation and scattered infested groups and single trees in territory previously uninfested proved that the surveys would have to be extended to all Lodgepole pine stands.

A 1.4% estimate was obtained from counts of the infested trees on strips 1 chain wide and 1 mile apart. In addition to the Targhee Forest the estimate includes the infested trees on a strip of timber approximately 30 miles long and 1 to 3 miles wide on the Montana side of the divide north of District 1. 947 miles of strip were run. The computed estimates totaled 119,874 infested trees on an area of 505,300 acres. The estimated number was 3.7 times the number of infested trees treated on the forest in 1931. Only a very small per cent of them were on treated areas.

This seemingly excessive number of estimated new attacks was accounted for in the survey by a very wide distribution of single infested trees on the strip lines outside of centers of attack and when the 1.4% estimate was applied to the whole acreage of the territory covered by the survey the computed number of these scattered trees alone totaled very high.

If control work were to be done in 1932 it would not include the scattered infested trees because of the impracticability of covering so extensive a territory 100% by the strip method to locate them, and no quicker method would be satisfactory. Disregarding the scattered infested trees outside of workable camp units, a 1932 control

job would probably be the same size as that of 1931. The cost of control was estimated in our fall 1931 survey report to be \$50,000. After that it would undoubtedly be necessary to mop up and to treat possible new developing centers of infestation for a number of years.

Surveys were also made of Yellowstone Park and of the other forests included in the control project resulting in an estimate of 231,487 infested trees that would have an estimated cost of control of \$430,841, according to the report, "History of Yellowstone Park Bark Beetle Control Project," by J. C. Evenden, Entomologist, October 29, 1931.

In the fall of 1931 the Forester, the Bureau of Entomology and the Park Service weighed the estimates and the probable future costs of control against the uncertainty of complete suppression and the factor of unknown flight limitations, which gave no assurance against reinfestation from both local and distant sources. It was decided to discontinue the Yellowstone Park Barkbeetle Control Project. The Cache Forest was grouped with the Wasatch, Ashley and Minidoka forests for further control work.

The decision was based also upon an urgent need for curtailing federal expenditures at this time and upon a readiness of the Park Service to drop the control work in Yellowstone Park, which would remove the basis upon which the project has continued during the past few years - the protection of the esthetic values of the Park.

Conclusions

The manner in which the infestations became so rapidly distributed has not been determined - whether the wide-spread, almost simultaneous infestations developed locally from endemic numbers of beetles in a period of generally favorable conditions for them, or whether the beetles were carried from places of inception in the northern Rocky Mountains and from later centers of infestation by wind or air currents.

Local development is indicated by the presence of bug killed black tops throughout the Lodgepole pine type and by the rapidity of local spread from local centers of infestation. On the other hand, the progressive character of the rise of the epidemic along the continental divide and the consecutive order in which unit control measures were required, beginning at the north, may warrant a belief in the opposite theory that the rapid regional distribution of the beetles might have been due to long distance flights, in which case reinfestation of treated areas would probably occur. So far we believe that long

distance flights have not caused reinfestations of treated areas but that new attacks on the Targhee treated areas can be accounted for by local spread from comparatively close untreated infested areas and by escapes from missed and insufficiently treated trees. However, neither theory can be discredited without definite information on the now little known and obscure flight habits of the beetles.

The success of local control by the burning-standing method has been demonstrated on the treated areas. Although it took three consecutive years to eliminate the beetles from the areas treated at the start of the control work, some of the centers of infestation treated in 1929 were finished in 1930 and some of the new centers of infestation were controlled by the one spring treating of 1931. The Flat Hollow and the Warm Creek-Wrights Creek camp units of District 7 and the Pleasant Valley unit of District 1 were treated in 1929 and 1930 and did not require treatment in 1931. The Hawley Gulch unit of Dist. 7 and the Outlet unit of District 2 required treatment only in 1930.

Improvements in the method of treating since the start of our control work in 1928 have made it so much more effective that no further treating is required on most of the territory treated in 1931. The control areas on the south half of the forest, which were formerly very heavily infested, need only mopping up in a few localities on the south end of districts 6 and on District 8. An estimate of 845 infested trees were recommended for treating in the spring of 1932 on the whole south end of the forest including the infested and control areas of districts 6, 7 and 8 on which 40,971 trees have been treated to date. The other treated areas that were recommended for mopping up in 1932 would be covered in connection with control work on adjacent infested territory and are located around the southwest corner of Yellowstone Park where new attacks have come in from the areas that were not completed last spring.

Although no new attacks can be found on some of the treated units, occasional infested trees can be found on most of them. The attacks, however, are weak - either one-sided, confined to the butts or having sparse, large pitch tubes, and a large per cent of them may be expected to be pitched out.

The infestation will be closely watched and the treated areas will be studied for sources of reinfestation, flight potentials, natural reduction, the strength and rate of spread of reinfestations and any other factors that might supply information valuable for the control of future epidemics.

Strip surveys should be made each fall for at least several years, covering a large enough proportion of the Lodgepole pine type to supply reliable information on what is happening to the infestation. This will keep us informed currently of the extent and distribution of the infestation or of any decline that may be due to changing weather cycles or to other causes.

	<u>COSTS</u>					: Fall
	1928	1929	: 1930	1931	: Total	: Survey
			: Spring and Fall.			: 1931
Wages	526.23	6103.76	5789.41	16823.16	29242.56	
Subsistence	276.72	2616.76	4177.84	7703.15	14774.47	391.05
Equipment	114.89	616.68	7461.28	1925.93	10118.78	
Oil	243.69	3767.11	2463.39	4700.35	11174.54	
Hauling	24.29	519.66	6563.36	4960.70	12068.01	
Travel	57.21	122.66	1323.67	982.35	2485.89	
Contributed	618.06	2722.71	6625.64	5799.71	15766.12	1337.24
Time & Exp.						
Total	1861.09	16469.34	34404.59	42895.35	95630.37	1728.29

<u>TREES TREATED</u>					
Dist. No.	1928	1929	1930	1931	Total
1	317	7588	4817	4032	16754
2	0	0	2603	0	2603
3	0	0	3220	3869	7089
4	10	2073	10367	20521	32971
5	0	27	355	247	629
6	2752	10993	6444	820	21009
7	0	10523	5184	1339	17046
8	0	0	745	1771	2516
Total	3079	31204	33735	32599	100617

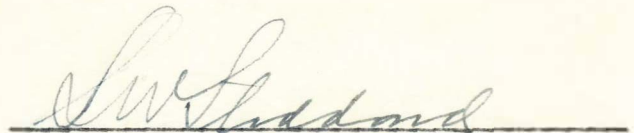
<u>ACRES TREATED</u>				
Dist. No.	1928	1929	1930	1931
1	160	4400	5708	11840
2	0	0	640	0
3	0	0	2500	3560
4	0	3200	21800	48640
5	0	0	600	300
6	1500	10000	19100	22000
7	0	5000	16600	13400
8	0	0	1000	3130
Total	1660	22600	67948	104870
Gal.Oil Used	1100	18920	29000	51945
Gal.per Tree	.403	.605	.859	1.6

	1928	1929	1930	1931
Cost per Tree	\$.60	\$.53	\$1.02	\$1.315
Cost per Acre	1.12	.73	.51	.41

Insect Control Reports Submitted by Targhee: -

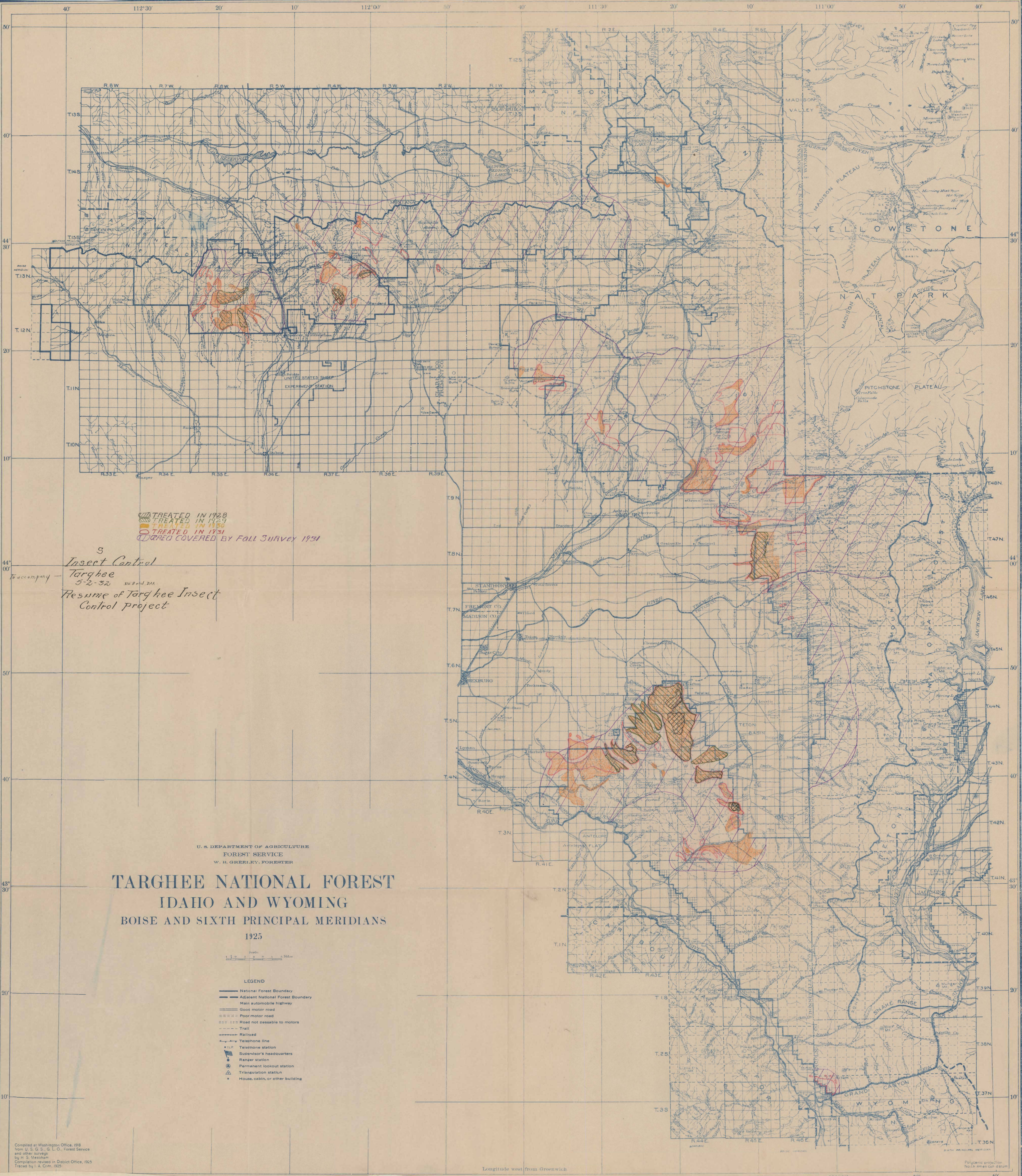
1. First Report on Infestation- - - - - Oct. 15, 1927
2. 1928 Control Report - - - - - Nov. 1, 1928
3. Fall 1928 Survey Report- - - - - Nov. 9, 1928
4. Control Plan for 1930- - - - - Oct. 17, 1929
5. 1929 Control Report- - - - - Dec. 12, 1929
6. Organization Plan for 1930 - - - - - Jan. 22, 1930
7. Revised Control Plan for 1930- - - - - Mar. 29, 1930
8. Spring 1930 Control Report - - - - - July 11, 1930
9. Control Plan for 1931- - - - - Oct. 10, 1930
10. Fall 1930 Control Report - - - - - Jan. 19, 1931
11. Organization Plan for 1931 - - - - - Jan. 30, 1931
12. 1931 Control Report- - - - - Oct. 23, 1931
13. Fall 1931 Insect Survey Report - - - - Oct. 26, 1931
14. Progress Report, 1930 and 1931 - - - - Dec. 10, 1931
15. Estimate for 1932 Clean-Up, D-1, 6 & 8- Jan. 12, 1932
16. Resume of Targhee Insect Control - - - May 2, 1932

A 1/4" scale map of the Targhee Forest is attached to show areas treated by years.



Forest Supervisor

May 2, 1932



TREATED IN 1928
TREATED IN 1929
TREATED IN 1930
AREA COVERED BY FALL SURVEY 1931

3
Insect Control
Targhee
5-2-32 DEB and JMA
Resume of Targhee Insect
Control Project

U. S. DEPARTMENT OF AGRICULTURE
FOREST SERVICE
W. H. GREELY, FORESTER

TARGHEE NATIONAL FOREST IDAHO AND WYOMING BOISE AND SIXTH PRINCIPAL MERIDIANS 1925

Scale
0 1 2 3 Miles

- LEGEND
- National Forest Boundary
 - Adjacent National Forest Boundary
 - Main automobile highway
 - Good motor road
 - Poor motor road
 - Road not passable to motors
 - Trail
 - Railroad
 - Telephone line
 - Telephone station
 - Supervisor's headquarters
 - Ranger station
 - Permanent lookout station
 - Transmission station
 - House, cabin, or other building